

REMARKS/ARGUMENTS

Applicants respectfully request reconsideration and continued examination of this application in view of the amendment and the following remarks.

1. Status of the Claims

Claims 1-9 and 11-33 are pending in this application. Claim 10 has been cancelled.

Independent claims 1 and 13 have been amended to add the limitation that the data is communicated over the Internet or an intranet. Support for the amendment can be found in the application as originally filed, for example, at Page 5, lines 14-17.

Claim 2 has been amended to delete the words "means for communicating said gathered data over the Internet or an intranet." The deleted limitation is now included in independent claim 1 from which claim 2 depends.

Claim 10 has been cancelled since the cancelled subject matter is now substantially covered by amended claim 1.

Independent claims 22 and 23 have been amended to add the limitations that the communication layer communicates to a remote location via a web server. Support for the amendment can be found in the application as originally filed including, for example, at Page 5, lines 14-17, Page 7, line 31 to Page 8, line 3, Page 8, lines 21-24 and Page 10, lines 16-19.

2. Prior Art Rejections

Claims 1-33 were rejected under 35 U.S.C. 102(e) as being anticipated by Publication Number 2004/0148047 A1 to Dismukes et al. ("Dismukes").

3. **Dismukes Does Not Teach or Suggest a Manufacturing Monitoring System Having a Web Server that Communicates Gathered and Calculated Data to a Remote Location via the Web Server and over the Internet or an Intranet**

All independent claims, claims 1, 13, 22 and 23 now include the limitations of communicating data to a remote location via a web server over the Internet or intranet, and are clearly patentable over Dismukes.

The Examiner has relied upon Dismukes as an anticipation of claims 1-33 under 35 U.S.C. 102(e). For a rejection to be proper under 35 U.S.C. 102(e), each and every claim element must be taught or disclosed in a single reference. Applicants continue to maintain that such a rejection under 35 U.S.C. 102(e) is improper since Dismukes lacks a disclosure of at least one claim element in each one of pending claims, claims 1-9 and 11-33. More specifically, Dismukes does not teach or disclose the claim elements of a web server and means for communicating the gathered data and calculated data to a remote location via the web server over the Internet or an intranet.

The Examiner has taken the position that the above noted claim elements are disclosed in Dismukes pages 14, 15, paragraphs 0293 to 0308, and claim 66. The Examiner also made of record, but did not rely upon "Arena Software Tutorial, Takus et al., pages 541-543 ("Takus"). Dismukes does use words such as "connectivity", "import/export" and "connections". While it is true that such words sometimes can be used in describing the transmission of information over the Internet, other times those words are used to describe something quite different. The proper meaning of words must be ascertained in light of the context in which they are used. The words "connectivity", "import/export" and "connections", when taken in the context that they are used in Dismukes, obviously do not refer to an Internet connection, or importing and exporting data over the Internet.

Possibly the Examiner is citing pages 14 and 15 of Dismukes merely as part of a broader argument. However, in the event this is not the case, Applicants would like to specifically point out the proper understanding of the words "connectivity", "import/export" and "connections" as used in context by Dismukes.

First, the word "connections" appears in the phrase "Connections between modules and submodels" at Dismukes on Page 14, 0298. The meaning and context of the word "connections" as used in Dismukes is merely a description of a relationship of information stored in a database or worksheet of a computer program, i.e.: a data structure.

Dismukes page 14, 0295 - 0298 states that:

"The model information that may be stored in the model database includes the following: Modules (including coordinates and data) from any panel. Submodels (including coordinates and properties). Connections between modules and submodels."

There is no indication that Dismukes is teaching that information is to be transmitted over the Internet to a remote location, or that there is a connection between remotely located computers. Rather, the context of the word "connections" relates to connections within a data base of a single computer program, i.e.: a data structure.

Secondly, the use of the word "connectivity" on page 14, 0293 is a reference to how the structure, or equipment, used in a manufacturing process is physically positioned within a manufacturing facility. Taken in context Dismukes is using the word "connectivity" to convey that in building a computer simulation model, the interactions between individual pieces of equipment are taken into account. In other words, if for example the efficiency of one piece of equipment is dependent upon the input of work pieces from an upstream machine, this relationship is included as part of the simulation model. Again, when taken in

context, the word "connectivity" as used by Dismukes does not provide a disclosure of the communication of data over the Internet or an intranet between remote locations.

Thirdly, the use of the words "import/export" by Dismukes on page 14, paragraph 0295, does not refer to importing or exporting data between remote locations. In context, Dismukes uses "import/export" merely to refer to the importing and exporting of data from one computer program, such as ARENA, to another external database in another computer program, such as EXCEL. Dismukes does not teach or suggest that such importing or exporting is accomplished over the Internet or intranet via a web server to a remote location.

The Examiner has also relied upon claim 66 as disclosing the claim element of "means for communicating the gathered data and the calculated data to a remote location via the web server". Claim 66 is, in part, claiming a unit production process (UPP) that comprises input transfer rates from an upstream UPP and output transport rates to a downstream UPP. The language of claim 66 merely discloses that the computer modeling system takes into account an interconnected array of unit production processes. More specifically, the model takes into account the transport rates of units being feed into a UPP from an upstream process, and the output transport rates from the UPP to a downstream process. Claim 66 of Dismukes clearly does not disclose communication of gathered and calculated data to a remote location by a web server over the Internet or an intranet.

The Examiner also included Takus, an Arena Software Tutorial, as prior art made of record and not relied upon, but considered pertinent. Applicants first note that Dismukes states that there are a number of commercially available software tools. Arena is just one of such software tools. There is no disclosure in Dismukes that the Arena software is to be utilized to transmit data over the Internet or an intranet by use of a web server. The Arena software is disclosed

by Dismukes as an illustration of how a dynamic simulation is linked to market demand. "To illustrate how this methodology works, the following example uses the ARENA simulation software...". Column 14, paragraph 0294.

Moreover, after explaining that the Arena software is used in the example as an illustration of how the methodology works, Dismukes immediately states, "However, the method can be generally applied to other simulation software." Column 14, paragraph 0294. There is no teaching that such other software must include the capabilities for transmitting data to a remote location via a web server over the Internet or an intranet. Moreover, the illustrative example using the Arena software given in Dismukes, in no way discloses the use of a web server and the Internet or an intranet to communicate data to a remote location.

Furthermore, Dismukes does not in any way refer a reader to the Takus tutorial, or any other tutorial. The Takus tutorial indicates that, "An extension to Arena (called Arena RT) is available for the purpose of using a simulation model to interact with external client applications". There is no teaching in Dismukes of using an Arena RT extension for external client applications. Furthermore, from inspection of the Arena software manufacturer's (Rockwell Software Inc.) web site, apparently versions of Arena prior to 5.0 did not include the Arena RT extension. (See attached printout from manufacturer's website. Page 1, paragraph 1, and page 23, paragraph 2 as Ex. A). Also, there is no indication that the Arena version to which Dismukes refers includes the Arena RT extension option, and if not, that Dismukes was even aware that Arena RT existed as an optional upgrade for Arena software.

Additionally, it is unclear whether the Arena RT extension has Internet capabilities based upon a reading of Takus. There is no mention of a web server, the Internet, or an intranet. It is also unclear from section 10 of Takus what is meant by external client application. Section 10 may merely be contemplating the use of a dedicated hard wiring between locations, or a

computer application that is external the Arena program. In any event, neither Takus, nor Dismukes, discloses all the elements of any of the pending claims, including in particular the limitation of communicating data to a remote location via a web server over the Internet or intranet.

Thus, it is respectfully submitted that Dismukes does not teach or disclose the communication of data to a remote location via a web server and over the Internet or intranet. Moreover, reference by Dismukes to Arena software is merely for illustrative purposes, as an example, for incorporating market demand into the computer model; and does not inherently teach or disclose the communication of data to a remote location via a web server over the Internet or intranet. This is especially true in light of the fact that not all Arena software includes the Arena RT extension, and the lack of clarity of what the Takus tutorial discloses regarding the Arena RT extension.

The Applicants' monitoring system provides a number of advantages not provided by the system of Dismukes, including the capability of real time and simultaneous monitoring of machines and assembly lines of a plurality of plants. Moreover, the Applicants' monitoring system that includes a web server that communicates the gathered data and calculated data to a remote location over the Internet or an intranet is advantageous for monitoring remote plants, even those plants that may be overseas. Such a system is able to reduce personnel costs since one person may be able to simultaneously monitor a number of plants. It is also able to provided monitoring, analysis and optimization of production processes on a real time basis to increase production efficiency of a plant and minimized downtime.


In view of the above, claims 1-9 and 11-33 are patentable over Dismukes, because Dismukes does not teach or disclose the communication of data to a remote location via a web server and over the Internet or intranet. Moreover, reference by Dismukes to the Arena software is merely for other illustrative

purposes and does not inherently teach or disclose the communication of data to a remote location via a web server over the Internet or intranet.

CONCLUSION

In view of the foregoing, all of the rejections have been overcome and claims 1-9 and 11-33 are allowable. An early indication of allowance is solicited.

Respectfully submitted,

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New Features

Arena 10.00 contains many customer-requested enhancements, specifically in the areas of model debugging, drawing capabilities, and template development. Listed below are the features added for this release, as well as a comprehensive listing of features added in previous releases.

*Looking to connect
your plant floor data
to your ERP system?*

[Arena Version 10.0](#)[Arena Version 9.0](#)[Arena Version 8.0](#)[Arena Version 7.01](#)[Arena Version 7.0](#)[Arena Version 6.0](#)[Arena Version 5.0](#)**Arena Version 10.0****Interactive Model Debugging Enhancements**

- **Command Window**—Command prompt editing capabilities have been improved. Users may now move the command prompt cursor left or right over command text (using the arrow keys), as well as insert, overwrite, or delete command text characters. The font and font size of the command window text may also now be customized in the Debugging tab of the **Tools > Options** menu item.

- **Runtime Elements Bar**—The Runtime Elements Bar now includes an Expressions tab that allows users to view and browse the current values of all specified expression elements in a running simulation model.
- **Entity, Transporter, and Resource Summary Dialogs**—These summary dialogs (displayed when a user clicks on an entity, transporter, or resource picture in a running animation) have been improved to provide more detailed information in a graphical tree organization.

Packaging Enhancements

- **Improved OptQuest Support**—Some run parameters in the module dialogs (e.g., conveyor lengths, equipment speeds, tank capacities) are now available as candidate controls in OptQuest.

VBA Enhancements

- **VBA Block**—Double-clicking on the VBA block no longer displays its module dialog but rather opens the Visual Basic Editor and sets the cursor to the first line of the block's Fire event. To edit the module dialog of a VBA block, right-click on the module and then select the **Edit via Dialog** item from the context menu.

Drawing-related Enhancements

- **Module Connections**—Users may now place multiple connections during a single connection session. To do so, click on the **Connect** button twice (the Connect button will remain depressed to indicate multi-connect mode) or select the **Connect** option from the object menu twice. Then draw as many connections as desired. A valid connection target (i.e., entry point or exit point) is now highlighted during a connection session if the mouse pointer is hovered over it.
- **Canceling a Drawing Operation**—Right-clicking will now cancel a connection/drawing action in addition to pressing the **ESC** key or performing some other action in the model window.
- **"Allow Move" Option for Module Connection Points**—This option is now available on the right-click menu of a selected module entry or exit point. This option must be enabled to

select and move the module entry or exit points graphically. It is disabled by default.

- **Rulers**—Horizontal and vertical rulers are now optionally provided at the top and left edges of each drawing window to show distances in Arena world units.
- **Guides**—Horizontal and vertical guides may now be added to drawing windows. Guides may be used to position shapes precisely, or help keep a group of shapes aligned as you move them by “gluing” shapes to guides.
- **Dimension Labeling**—A new **Show Dimensions** button has been added to the Draw toolbar. This feature provides an option to automatically display dimension labels (e.g., lengths, widths, heights) for any shape in a drawing window. A user may choose for a shape to never display dimension labels, always display dimension labels, or only display dimension labels when the shape is selected.
- **Arrow Styles**—A new **Arrow Style** button has been added to the Draw toolbar. This feature may be used to apply an arrow style to a selected line type object.
- **Line Widths/Styles**—The interface for specifying the width and dash style of lines and borders has been separated into distinct **Line Width** and **Line Style** buttons in the Draw toolbar. For the **Line Width** button, users may now specify any custom line width from 1 to 20 pixels.
- **Line Patterns**—A new **Line Pattern** button has been added to the Draw toolbar. This feature may be used to overlay a “line pattern” along the length of a selected line type object or solid shape border. Functionality is also provided that allows users to create new line patterns, edit a line pattern's graphics, and save and open line patterns from external libraries.
- **Object Coloring**—Minor enhancements have been made to the **Line Color**, **Fill Color**, **Text Color**, and **Window Color** buttons in the Draw toolbar, including increasing the default color palette size from 16 to 40 colors.
- **Animation Path Drawing**—Users may now easily place multiple animation paths during

a single drawing session. New visual cues (such as object highlighting) are now provided to aid users drawing paths between intersection or station objects. The identifiers of all new path objects are now automatically given a default name by Arena when they are placed.

Navigation/View Enhancements

- Improved SIMAN View Option—Larger .mod and .exp files may now be viewed within Arena that previously had to be viewed using an external editor. In the model file, users may now easily navigate to a module in the model window that corresponds to a set of SIMAN block statements by clicking on the appropriate hyperlink in the model file. Note that this feature is available only on NT technology-based operating systems.
- Model Thumbnail—A thumbnail image of the model's active drawing window is now provided in the Navigate pane of the Project Bar. This thumbnail helps users navigate and modify the current view within the active drawing window.

Flow Process Enhancements

- Assignable Sensor Locations—Tank sensor locations may now be reassigned dynamically at runtime in the model logic.

General Modeling Enhancements

- Batch/Group Representative Entity Type—A new Representative Entity Type field in the Batch module (Basic Process panel), Group module (Blocks panel), and Combine module (Blocks panel) allows a user to assign explicitly the entity type of the created group's representative as the group is formed.

Template Development Enhancements

- New Dialog Design Window—A new Dialog Design window has been added for template development. This window replaces the Operand window interface provided in previous Arena versions. The Dialog Design window's features include:
- Drag-and-drop, graphical tools for module dialog design.

- Operand Explorer tree to navigate a module's dialog and operand structure.
- Properties grid to find and edit an object's data and properties easily.
- User-Specified Expression Builder Definitions—Users may now add their own custom expression builder expression strings to a module definition (whereby the expressions are then available in the Expression Builder dialog's tree-view when a module instance is placed in the model).

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Arena Version 9.0

The following is a list of new features included in this release of Arena:

- **New Interactive Model Debugging Tools**—Arena's extensive debugging features have been significantly improved with the addition of a comprehensive graphical interface. It features new windows that can be docked in your model window or even exist elsewhere on your desktop, for example on a second monitor. It also includes tree controls, drag and drop support, and much more.
- **Command Window**—(Run > Run Control > Command) is now dockable, with new features to facilitate entering and repeating run controller commands. At the command prompt, users may now also scroll through a buffer list of previously entered commands.
- **Debug Bar**—A new dockable Debug window (View > Debug Bar) has been added to define breakpoints and watch expressions, view the active entity's attributes, and view the contents of the simulation's event calendar. Each of these items will appear as a tab under the Debug Bar.
- **Breakpoints Window** in the Debug Bar provides a tool to manipulate the execution to examine operations and logic, evaluate changes in system status, or make presentations to others. Breaks in execution can be established at specific times, when a specific entity number becomes active, on a module, or on a conditional statement.

- **Calendar Window** in the Debug Bar allows you to view all future events scheduled on Arena's event calendar for the running simulation. Event times, entity numbers, and event descriptions are displayed in a table format.
- **Active Entity Window** in the Debug Bar displays the attribute values of the active entity in a tree-view organization. The value of user-defined and other assignable attributes can be changed via that tree view.
- **Watch Windows**—Three identical Watch windows in the Debug Bar allow you to monitor the values of any expression in the simulation.
- **Runtime Elements Bar**—A new dockable window (View > Runtime Elements Bar) is now available to easily browse the current property values of simulation elements (e.g., resources, queues, transporters, etc.) during a running simulation. As additional elements are defined, they will automatically appear as a new tab under this bar.
- **Variables Window** in the Runtime Elements Bar displays all of the user-defined variables and provides a convenient way to examine and change their values. It also incorporates an array editor to facilitate viewing and editing one and two dimensional arrays.
- **Queues Window** in the Runtime Elements Bar displays all of the queues in the model as well as properties such as the current number of entities in the queue and their average wait time.
- **Statistics Window** in the Runtime Elements Bar displays a tree view of all of the statistics being collected as well as their properties such as average value and last value.
- **New Version of OptQuest for Arena**—OptQuest has been significantly enhanced for this release. In addition to dramatically improved algorithms and user interface, it now loads and runs faster. Refer to the What's New section of the OptQuest help for more details.
- **Intuitive Explorer interface** makes it easy to view and access components of your optimization model.

- **Tree view** with controls and responses organized by user-specified category makes it easy for users to browse and select candidate controls and responses in large models.
- **Improved Search Algorithms** including Improved Solution Combination Algorithms and new solution Analysis Tools.
- **Ability to Select and Edit Multiple Controls** in the new user interface.
- **Enhanced Constraint Definition** including combining controls and responses, and allowing both linear and non-linear expressions.
- **Enhanced objective definition** including combining controls and responses, and allowing both linear and non-linear expressions.
- **Suggested Solutions** allows you to enter your own suggested solutions as well as save your solutions from an optimization and use them the next time the optimization is run.
- **Better Analysis of Solutions** after an optimization has completed allows ranking and selection, and examination of solution details.
- **Advanced Optimization Techniques** allows you to run additional replications for selected solutions.
- **Animation/Presentation Enhancements**
 - **AVI Capture**—Users may now record all actions in the Arena application window, including running animations, to an AVI file. To use this feature, go to Tools > AVI Capture.
 - **Removal of color limitations**—The runtime 256 color limit has been removed from Arena, so it is now possible to run models at the desktop color depth. To use this feature, toggle on Object > Animate at Desktop Color Depth.
- **New Modeling Enhancements**
 - **Flow Process Capability**—The features of the Flow Process Product introduced in

Arena 8.0 have now been included in most high-end Arena products. This new Flow Process panel provides modules to facilitate modeling bulk material holding areas, sensor detection, control logic, and continuous and semi-continuous flow between those holding areas. A new FlowProcessUtil panel has been added that complements the features and modules in the Flow Process panel. This new panel includes Flow, Tank, and Sensors modules.

- **Unique Entity Number Generation**—Entity numbers are no longer routinely recycled. After an entity is disposed it is placed on an available entities list, but now that list is only used after all space to create new entities has been exhausted. This results in more unique entity numbers and easier model debugging when using trace and breakpoints.
- **Read/Write Enhancements**—In the Basic Process Assign, Basic Process Decide, and Advanced Process ReadWrite modules, we have added direct support for 1 and 2 dimensional arrays.
- **EntityNumbersValid Variable**—This new variable is now available for performing checks on whether an entity with a particular identification number exists in the simulation.
- **New Packaging Machine Type for Non-Accumulating Conveyors**—The run parameters of a non-accumulating conveyor may now be specified in two different ways. If the units on the conveyor always travel in single file, the run parameters may be described as a processing rate and capacity. Otherwise, you may now specify a non-accumulating conveyor's run parameters by entering its length, width, nominal belt velocity, and unit density.
- **Save Array Sizes with Model**—Users may now specify and save SIMAN array sizes with individual models via the Run > Setup > Array Sizes tab. This eliminates the need to guess at model sizes when loading a large model from someone else. The Tools > Options > Array Sizes tab now specifies the default array sizes for new model documents.
- **"Auto Load " Option**—You may now choose to load a New Model, No Model, or the Last Active Model when the Arena

application is started. If Last Active Model is chosen, and the Run Last Active Model check box is selected, the model will automatically run when Arena is started. See the Tools > Options > Settings tab to use this feature.

- **FactoryTalk Activation**—We have added an optional new activation method based on the popular industry-standard FLEXIm from Macrovision. This provides many valuable new features including:
 - **No reliance on master disks.** Activation may be accomplished over the network with no involvement with Rockwell personnel.
 - **USB Dongle support.** An optional USB dongle is available to allow greater flexibility in moving around activations.
 - **Server-based network license.** This permits activations to be shared on a network while still protecting network security.
- Please see the Install Notes for more information.
- **Template Development**—We have included the first in a new series of enhancements to make template-building much easier.
- **The new *Arena Template Developer's Guide*** is a significantly updated version of the earlier guide and highlights important new features and procedures that were previously undocumented. Look in Help > Product Manuals or the online help to learn more about using creating your own Arena templates.
- **The Professional Edition Toolbar** has been renamed the Template Development toolbar.
- **Arena NewsFlash**—This new feature (Tools > Arena NewsFlash) is a news feed service that helps keep users informed of simulation software updates, event announcements, special promotions, and other important Arena-related news. NewsFlash updates are retrieved using the existing internet connection, and may be executed on command or scheduled automatically during Arena startups.

In addition to the new features listed above, we have made exciting changes to our product lineup that will enhance the modeling tools available to most current customers.

- **Arena Basic Edition**—Arena BE will remain our entry level offering targeted at business process modeling, customer service, and general modeling applications. It will continue to be the foundation of all Arena products and benefit from general Arena development.
- **Arena Standard Edition**—We have decided to discontinue Arena SE as a stand-alone product (although it will still provide the basis of Arena Contact Center Edition). All Arena SE customers under current maintenance will receive no-charge upgrades to the newly enhanced Arena Professional Edition.
- **Arena Professional Edition**—This will become our new flagship product. In addition to its template-building capabilities, it supports problem solving across all domains and applications. All copies of Arena PE will now include the bulk material handling capabilities of the Flow Process template as well as OptQuest for Arena for enhanced problem solving.
- **Arena 3DPlayer**—3DPlayer Version 2.0 is a comprehensive 3D Animation product. The 2.0 release has added many important features including an object editor, new animation constructs and AVI generation. Refer to the 3DPlayer Release Notes for more details. Most Arena shipments will include an evaluation copy of 3DPlayer.
- **Arena Factory Analyzer**—Formerly known as Arena Packaging Edition, this product will provide a comprehensive modeling tool for manufacturing. It includes not only the high speed process capabilities in the Packaging template, but also the bulk material handling capabilities of Flow Process template, the real time communication and control capability of Arena RT, template-building capabilities, and the all new OptQuest for Arena. All Arena Packaging Edition customers under current maintenance will receive a free upgrade to the new Arena Factory Analyzer.
- **Arena Enterprise Suite**—For the organization with a wide range of modeling problems, we have offered this convenient

bundle of products. It includes all the features of Arena Factory Analyzer plus Arena Contact Center Edition and Arena 3DPlayer; and all at a significant discount.

- **Concurrent (Network) Versions**—Most Arena products will now be available in a server-based network version. This will solve many of the security issues in organizations who need group access to Arena software.

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Arena Version 8.0

Guided Vehicles—Added guided vehicle support to the Advanced Transfer panel.

- Four new and revised modules in the Advanced Transfer panel provide the ability to use guided transporter features without going to the Blocks and Elements panels. Guided transporters are useful for modeling AGVs, people, and anything that moves on a constrained path.

ActiveX Controls—ActiveX Controls can now be placed in the model window and interact with the simulation.

- **Symbol Factory ActiveX**—Extending the popular set of symbols added in an earlier release, you can now load ActiveX Controls associated with each of the 4,400 symbols.
- Use Controls to display status changes in your model (linked to any expression).
- Use Controls to update model variables with GUI interaction.
- Write VBA to provide advanced interaction with Controls.

Export Summary Statistics to a CSV File—This new add-in allows users to extract summary performance data from an Arena report database in a way that can be shared and analyzed in other programs. This is particularly useful for doing Six Sigma analysis and for doing post-run data analysis in programs like MiniTab.

Macro Recording

- You can now define shortcut keys to invoke macros and other VBA routines (**Tools >**

Macro > Edit Shortcuts).

- A Record Macro toolbar provides enhanced control while you are recording a macro.

Rotating Symbols

- Resources and Global symbols can rotate based on the value of an expression. This permits easier animation of such things as robot arms and machines that rotate in place.
- The Adjust module was added to the Advanced Process panel to make it easy to change the value incrementally of a variable at a specified rate. Although this is a general feature, it is particularly useful with rotating symbols to cause rotation to occur with an acceptable fidelity.

User Interface Enhancements

- A slider control is available on the toolbar for adjusting run speed.
- The size of the recently used file list can be customized in **Tools > Options > Settings**.
- Arrowheads can be displayed on connector lines to indicate direction of flow (**Tools > Options > Drawing and View > Connector Arrows**).
- An exact zoom factor can be specified in the zoom combo box (rather than selecting only from a predefined list).
- Database Import/Export now supports visualization settings.
- We now support Crystal Reports® 9.0 to provide the latest compatibility.

Real-Time

- New clock synchronization algorithms allow users to customize clock behavior as needed. This makes Arena easier to use with HLA and other model synchronization procedures.

**Application-Solution Template
Changes/Additions in Version 8.00****New Flow Process Template**

The new Flow Process template is one of a family of application solution templates (ASTs) built on the Arena simulation system. It is designed specifically to model combined discrete-continuous systems (e.g., batch processes). If a system contains both semi-continuous batch processes as well as high-speed packaging or filling operations, then it may be desirable to use the Flow Process template with the Arena Packaging template. (This panel requires a specific activation key; it is not included with Arena Standard Edition.)

- The Tank module represents a holding area where material is stored and defines the regulators that control flow into and out of the holding area.
- The Flow module creates a temporary flow connection into and/or out of a tank, or between two tanks. The entitybased flow logic of this module is ideal for representing batch processing operations.
- Five additional modules provide sensors and additional flexibility.
- A new Level object of type Flow provides an easy-to-use mechanism for animating pipes and other devices that carry flow. The level provides an animation indicator of both direction and relative rate of flow.
- Several new examples have been provided to illustrate the Flow Process concepts.

Arena Packaging Template Changes

- The Tank module in the optional Flow Process template may now be used in place of the Packaging Tank module. Refer to the "New Flow Process Template" section above to see how this new product can facilitate modeling semicontinuous batch processes feeding a high-speed packaging line.
- In the Machine and Palletizer modules, the Time Between Failures (TBF) can now be specified as either "Calendar Time" or "Processing Time." Processing Time is time that the machine is running (e.g., not stopped or blocked) and is not starved. In Arena 7.01.00 and earlier, the time between failures of a machine was always assumed to be "Calendar Time."
- In the Machine and Palletizer modules, the Expected Uptime and Reliability Over A

Time Span approaches for defining equipment reliability always assume the MTBF is processing time, NOT calendar time as assumed in previous versions.

- In the Conveyor module, the Time Between Failures (TBF) can now be specified as either "Calendar Time" or "Running Time." Running Time is time that the run speed of the conveyor is greater than zero (i.e., the belt is moving).
- In the Conveyor modules, the Expected Uptime and Reliability Over A Time Span approaches for defining conveyor reliability always assume the MTBF is running time, NOT calendar time as assumed in previous versions.
- Several module dialogs that prompt for time durations now include "Time Units" operands to specify that a time value is in seconds, minutes, hours, or days.
- The graphical handles of all Packaging modules have been enlarged to the size of the module handles in the Blocks and Elements panels. Also, the Name operand value is now displayed in a module's handle text (e.g., "Cartoner," "Filler Accumulator") rather than the module definition (i.e., "Machine," "Conveyor," etc.).
- Added detection of errors involving unconnected entry points.

Other Resources

- New SMART files illustrate the concepts of guided transporters, rotating symbols, the Adjust module, and ActiveX Controls.
- Significant enhancements have been made to online help and printed documentation.
- The *Simulation with Arena* (3rd Edition) textbook includes significant new updates, including all features introduced through Arena 7.01.

Notes on Activation

If you are upgrading from Arena 7.0 or 7.01, Arena 8.0 cannot be installed on the same machine without first uninstalling the earlier version. We generally recommend replacing the previous version, but if you want to retain both versions,

they must be installed on separate machines. In either case, a new activation will be supplied that is required for Arena 8.0. Please note that a single-user license does not permit simultaneous use by more than one person.

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Arena Version 7.01

- **Run Interaction** — Interaction with a running model has been made more intuitive. You can now change the run mode of your model — for example, Stop or Fast Forward — without pausing it first.
- **Macro Recording** — The Record Macro toolbar has been added to make recording macros easier.
- **Doe File Properties** — Windows file properties now include key Arena model information — including a Description and the Arena version number. In addition, personalized information about your model can be added via the Property dialog's Custom and Summary tabs.

Note: Arena 7.0 and Arena 7.01 cannot exist in side-by-side mode, therefore both cannot be installed on the same machine. You must uninstall Arena 7.0 before installing Arena 7.01.

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Arena Version 7.0

File Read/Write Enhanced To Support Additional Access Types—We now offer direct support for reading and writing Microsoft® Excel spreadsheets and Microsoft® Access databases. This makes it much easier to initialize models or read runtime information from existing data sources. It is also easier now to share output between models or analyze custom output data in other products or report generators.

Using the File and Read/Write modules in the Advanced Process panel, a simulation model can now read input from and/or write output to a variety of popular spreadsheet and database programs. The read/write enhancements utilize ActiveX Data Objects® (ADO), a Microsoft

technology that provides high-performance data access to a variety of data stores.

In addition to Excel, Access, and generic ADO support, a model may also now read from or write directly to files in XML format.

Better Status Animation—Status animation objects (levels, clocks, histograms, etc.) have been improved and are more user-definable.

All status animation objects (Levels, Clocks, Histograms, etc.) now include an optional user-specified title that includes controls for the text, font, size and location.

Plots and levels include an auto-scale option where the minimum and maximum Y-axis labels are re-scaled when the expression value monitored falls outside the current defined range.

The pictures used in the distributed fill level animation can now be customized. You can now replace those default disk pictures with customized pictures by enabling the *Use Picture* options in the Level dialog.

Plots include an option to synchronize all minimum and maximum values across all expressions monitored.

Variables automatically adjust the format when the expression monitored goes outside the defined format.

Model Documentation/Data Tips—Arena's model documentation now includes data tips. Data Tips are tooltips that you can choose to display when your mouse hovers over an object. Data Tips may include a default description, a description you have specified, or both. A data tip may be specified for any object in a model (this includes graphic objects as well as modules).

In a model logic window, an object's data tip is displayed when the mouse is hovered over the object. In a spreadsheet window, a module's data tip is displayed when the mouse is hovered over the module's row heading.

Data tips may include default descriptive information automatically provided by Arena and/or user-defined descriptions. To enter a custom description, right-click on

any object and select the *Properties* command.

Data tips may be disabled/enabled via the *View > Data Tips* menu.

Model Documentation Report—This useful report summarizes all the available documentation about a model, including the project title, analyst name, file name, report date, number of replications, start date/time, warm-up period, module names/types/descriptions, operand information, submodel descriptions, etc. It provides a convenient way to analyze a model without opening and closing multiple objects.

To run the Model Documentation Report, choose *Tools > Model Documentation Report*. Use the Arena Model Documentation Options dialog to choose the Model Data and Report Options you need.

A new *Project Description* field has been added to the Run Setup dialog and may be included in the Model Documentation Report.

2-D Interface For Editing Variable and Expression Arrays—The *Initial Values* of a Basic Process Variable module and the *Expression Values* of an Advanced Process Expression module may be edited using a two-dimensional spreadsheet view.

To edit data using the 2-D editor, simply click the *Initial Values* cell or the *Expression Values* cell in the module spreadsheet. The initial rows and columns dimensions of the spreadsheet will be automatically set to the *Rows* and *Columns* dimensions specified in the module.

New Date and Time Variables—New calendar-related variables have been added to Arena. These variables provide runtime access to a variety of date/time information, including the calendar year, month, week, day, hour, minute, or second of a specified simulation time.

Arena Symbol Factory—Arena animations can be enhanced using Arena Symbol Factory's extensive library of symbols. These symbols can be used for entity, resource, transporter or global pictures; or as graphic symbols within a model window. You can copy these

symbols directly to the Arena model window, add them to your own libraries (.plb files), or add them to any of the Arena picture library files.

- **Print Model To Scale**—Arena models may now be printed to scale. In the Print Setup dialog, specify the *Scale Factor* as the number of Arena world units per printed inch or cm. The breaks between pages (and page numbers) resulting from the scale factor may be viewed using the *Page Breaks* command in the View menu. Specify the pages to print in the Print dialog.

The current model view, selected objects in the model, and named views may also be easily printed from the Print dialog. These options are always scaled to a single printed page.

- **DXF Import feature and documentation upgraded to support AutoCAD Release 14, AutoCAD 2000, and AutoCAD 2002**—In the previous release, Arena only supported conversion of DXF files created with Autocad R12 and R13. Since R13, there have been the following Autocad releases: R14, R15, 2000, and 2002. Arena now supports these additional Autocad releases. In addition, improved color and font support has been added as well as support for several new Autocad objects: LWPOLYLINE, MLINE, MTEXT, DONUT, RAY and XLINE.

- **HTML Help**—Arena Online Help is now HTML-based.

HTML Help features a single tri-pane format that displays the navigational buttons; the Table of Contents, Index and Search tabs; and help content. The Table of Contents is dynamically updated as you navigate the content.

The *Search* function in HTML Help is easier to use and more robust than the WinHelp *Find* function.

Arena Online Help has also been completely reformatted for this release to improve readability.

- **Macro Recording**—A macro recording feature has been added to allow users to more easily learn, prototype, and build VBA extensions into their models. A macro is a series of visual basic statements that

are stored in a subroutine in a Visual Basic module. When you record a macro, Arena stores information about each step you take as you perform a series of commands. You can then run the macro to repeat, or "play back," the commands.

- **VBA Blocks supported in PE templates**—The VBA Block can now be used in a template module's logic window. This block allows an entity to fire a VBA event during the simulation run. This feature now allows users to incorporate custom code and messages in their templates.

- **Object Model Enhancements**—Several enhancements have been made to the Arena object model. Most properties of animation objects (colors, font, label, etc.) are now exposed in the object model. Additional SIMAN variables (time attributes, cost attributes, etc.) are now available in the object model.

- **Operand Length Limitation Removed**—In previous releases, the total number of characters entered into a module field (i.e., operand) was limited to either 127 or 255 characters, depending on the operand's data type.

This length restriction has now been removed, thus simplifying the entry of large expressions into a model.

Note: symbol names may have an unlimited length, but only the first 255 characters of a symbol name are actually considered when evaluating an expression.

- **Packaging Edition: Custom Conveyor Animation**—The pictures used to animate traveling and accumulated units on conveyors (or conveyor machines) may now be customized. By default, the distributed fill level animation shows green disks for traveling units and red disks for accumulated units. You can now replace those default disk pictures with customized pictures by enabling the *Use Picture* options in the Level dialog.

- **Factory Analyzer Edition: New Bill of Materials and Reorder Policy Features**—Bill of Materials (BOM) information may now be specified for a material using the new *Bill of Materials* repeat group in the Material module. In this

repeat group, specify the top-level BOM requirements of a material such as component parts or subassemblies. The BOM items may be either purchased or manufactured, whereby manufactured items may in turn have their own BOM defined.

A new Reorder Policy module has also been added to the Factory panel. A reorder policy automatically replenishes the supply of a material (via purchase orders or manufacturing orders) when the unallocated quantity of that material decreases below a specified level (referred to as the Reorder Point). A reorder policy is assigned to a material via the new *Reorder Policy Name* field in the Material module.

A new *Earliest Start Rule* option has also been added to the Make Order module. This option may be used to set the release date of a manufacturing order created at a Make Order module or via a reorder policy. Options include whether to release an order immediately when it is created, or to release an order based on the lead times of its BOM requirements. The Earliest Start Rule does not apply to manufacturing orders specified in the Manufacturing Order module, as the earliest start dates for those orders are explicitly specified.

Improved Reliability and Performance—A number of other changes have been made to improve the reliability and performance of Arena.

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Arena Version 6.0

- **Arena Factory Analyzer**—An S95-based Factory template that allows you to quickly build a simulation model of your plant and manufacturing processes.
- **Calendar Based Schedules**—Calendar Schedules (also referred to as Time Patterns) allow you to define schedules in terms of time related to a calendar and clock, vs. the previous Arena approach based on elapsed time relative to the start of the simulation run. Duration Schedules are edited via the Graphical Schedule Editor or via Schedule module data (in the spreadsheet or dialog), as in previous Arena releases.

- **FactoryTalk Server**—A central repository and editors for importing data to and from Arena Factory Analyzer and other RSBizware components/products.
- **Aggregated Activity Areas and Stations with reporting options**—Arena 6.0 includes the new Activity Areas module (Advanced Transfer panel). This allows a group of stations to aggregate their statistics into one category. This makes it easier to collect and view related statistics of processes that occur at different stations.
- **New global model options for statistics-gathering and run control**—Arena's Run/Setup menus have been reworked. The Project Parameters tab now offers the option to collect statistics on Stations and Activity Areas in addition to Costing, Entities, Queues, Processes, Transporters and Conveyors. The Run control tab has been split into standard and advanced run control categories.

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Arena Version 5.0

- **Design, Manage, and Run Alternative Scenarios with the New Process Analyzer**—Define your own scenarios and obtain quick results for analysis using Arena's new Process Analyzer. The Process Analyzer replaces the former Scenario Manager application, providing the same basic functionality plus much, much more.
- **Handle Multiple Types of Customer Contact with Arena Contact Center**—You can now handle multiple types of customer contact and observe the effect of the customer contact strategies across your entire enterprise (business processes, manufacturing, and supply chain). Due to the expanded functionality, Arena Call Center has become Arena Contact Center .
- **Create Complex Expressions Using the New Expression Builder**—Create complicated expressions without the need to know variable names or syntax. Simply right-click in any module or animation object field that accepts an expression and choose Build Expression from the pop-up menu. What you'll see depends on what you've already added to the model—it's all context-

sensitive.

- **View and Distribute Any Model Free—** This enhancement allows you to demo any product you haven't yet purchased, or use Arena's free runtime mode to run any protected model sent you to by a colleague. The ability to run any model assumes that you've installed all products with our new all-in-one installation process. If you'd rather not do that, you can use the Custom install option to select only those you want.
- **Easier All-in-One Installation—**Arena's entire product family (Arena Basic Edition, Arena Standard Edition, Arena Professional Edition, Arena Contact Center Edition, and Arena Packaging Edition) is now installed in one simple step when you choose the Typical install option. You can install products selectively using the Custom install option, or get just the minimum needed for Arena Basic Edition using the Compact install option.
- **Improved Look and Feel—** As a new member to the Rockwell Software family, we have transitioned our products to meet our new corporate standards. For example, we've reorganized Arena's Help menu structure and moved much of the Welcome Screen information into the help files. And our installation and authorization process follows Rockwell's standards for consistency across all other RSI applications.
- **Link to Web-Based Support and User Zone—** We've provided a direct link to Arena's home page and the customer-oriented User Zone where you can review frequently asked questions, download example models, send product enhancement suggestions, and download the latest software updates. You can also link to Rockwell Software's home page to see all of the other great products we have to offer. These links are available on your Arena Help menu.
- **Simplified Authorization Process—** Arena 5.0 uses the Rockwell Software Activation. This activation is contained on a floppy disk that is shipped along with your software CD and is ready to run immediately without the need to contact us for special codes. For more information on the Rockwell Software Activation, consult the Activation Help utility in the Rockwell Software section of your Start menu.

- **Export/Import Model Logic to Access or Excel**— Save all of the modules, data, and connections in your entire model to a relational database in Access or Excel simply by choosing a menu option from the Tools menu. Create a new model from Access or Excel via the Tools menu as well. This feature does not replace Module Data Transfer, which is still useful for updating existing modules in a model.
- **Run Models in Real Time with Arena RT**— Arena's RT features now have been integrated into the standard user interface and templates. Enable inter-process communications with an external application via the Run in Execution Mode option in Arena's Run/Setup/Run Control dialog.
- **Improved Version of OptQuest for Arena**— Want to determine the sensitivity of constraints and requirements on optimal solutions? A new Efficient Frontier Graph feature helps you understand what effect a requirement has on the optimal solution and what would happen if the requirement were relaxed or tightened a little. The Performance Graph has been upgraded to allow plotting of an additional y-value, which can be the value of one of the controls or responses. Also, OptQuest now has improved Control and Response spreadsheet loading, even on very large Arena models.
- **More Flexible Costing**—You can now enable/disable costing information on specific entities, processes, resources, queues, conveyors, and transporters. Previously you could collect statistics on all or none. Now you can choose to report stats on some but not others.
- **Arena Packaging Edition Updated for Arena 5.0**—Arena Packaging Edition (formerly known as HiSpeedSim) has been updated to take advantage of new features in Arena 5.0.
- **Improved Random Number Generation**— Arena now uses a state-of-the-art random number generator, ensuring that your data is less biased than ever before and allowing for a virtually unlimited number of random number streams without pre-defining them.

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